

LIBRARY COPY

NOV 14 1966

ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT 1965

PORT COLBORNE

water pollution control plant

DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca



ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Port Colborne Local Advisory Committee,
City of Port Colborne.

Gentlemen:

I am pleased to provide you with the 1965 Annual Report for the Port Colborne Water Pollution Control Plant, OWRC Project No. 59-S-47.

We appreciate the co-operation you have extended to our Operations staff throughout the year, and trust that continuation of this close association will ensure even greater progress in the sphere of water pollution control.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly", written over the typed name.

D. S. Caverly,
General Manager.



ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET
TORONTO 5

J. A. VANCE, LL.D.
CHAIRMAN

J. H. H. ROOT, M.P.P.
VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am pleased to provide you with the 1965 Annual Report on the operation of the Port Colborne Water Pollution Control Plant, OWRC Project No. 59-S-47.

The report presents design data, outlines operating problems encountered during the year and summarizes in graphs, charts and tables all significant flow and cost data.

Yours very truly,

A handwritten signature in cursive script, reading "B. C. Palmer".

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

This report provides useful information on the operating efficiency of this project during 1965. It is intended to act as a guide in gauging plant performance. To implement that aim, it includes detailed statistical and cost data, a description of the project and a summary of its operation during the year.

Of particular interest will be the cost data, which show the total cost to the municipality and the areas of major expenditure.

The Regional Operations Engineer is primarily responsible for the preparation of the report, and has compiled and arranged the material. He will be pleased to answer any questions regarding it. Other groups, however, were involved in the production, and these include the statistics section, the Drafting Section of the Division of Sanitary Engineering and the Division of Finance.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

Foreword	1
Title Page	3
'65 Review	4
Glossary	5
History	6
Project Staff	7
Description of Projects	8
Project Costs	14
Plant Flow Chart (West Side)	19
Design Data	20
Process Data:	
West Side	24
East Side	38
Conclusions	Inside back cover

PORT COLBORNE
water pollution control plants

operated for

THE CITY OF PORT COLBORNE

by the

ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN: Dr. James A. Vance

VICE-CHAIRMAN: J. H. H. Root, M.P.P.

COMMISSIONERS

W. D. Conklin, Q. C. H. E. Brown
D. A. Moodie L. E. Venchiarutti

GENERAL MANAGER: D. S. Caverly

ASSISTANT GENERAL MANAGERS

L. E. Owers K. H. Sharpe
F. A. Voegelé A. K. Watt

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5

'65 REVIEW

Operating costs per million gallons were reduced by 35% from 1964. However the total operating costs for 1965 rose from \$57,818.45 to \$64,498.43.

Secondary treatment was provided for a total of 731.5 million gallons of sewage in 1965. This is a considerable increase over 1964 and was in part due to a correction factor now applied to the flow meter at the East Side Plant. The correction factor was devised following fill and draw tests in which the accuracy of the meter was checked. It was found that there was considerable error in this meter and although this was not determined until mid-year all flow figures for 1965 were subsequently corrected. However, there was also a physical increase in flow as indicated by the 17.6% increase at the West Side Plant.

The degree of efficiency achieved by both plants in 1965 was satisfactory. OWRC effluent quality objectives of 15 ppm BOD and SS were exceeded 4% and 5% of the time respectively at the West Side Plant and 42% and 77% of the time respectively at the East Side Plant.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1959 - 1965

In 1959, the Town of Port Colborne and the Ontario Water Resources Commission initiated plans for the construction of the West Side Sewage Treatment Plant. This new activated sludge plant was placed in operation in November 1961, and officially opened on July 25th, 1962.

On June 1st, 1961, at the request of the Town of Port Colborne, the Division of Plant Operations of the Ontario Water Resources Commission took over the operation of the existing sewage system comprised of the Killaly Street and King Street plants and seven pumping stations. At the same time four members of the Town staff were transferred to the OWRC staff.

At the end of 1962, the Clarke Street pumping station was placed in service. This station is part of Project No. 60-S-73 which also includes a forcemain to the Killaly Street plant and sanitary sewers.

The summer of 1963 saw the incorporation of the Fretz Park pumping station, Project No. 62-S-108, into the system. This new station serves the southeast portion of the town and replaces the old Colborne Street station.

During the fall of 1964 tenders were called for the construction of sewers and two pumping stations, Project No. 62-S-100, to service the northwest area of the town. Construction commenced early in 1965 and was completed the same year.



JIM TELFER
CHIEF OPERATOR

Project Staff

Operators

M. Baggio	J. Bilodeau
C. Root	J. Sieber
S. Toth	E. Young

Mechanic: J. Blanchard

COMMENTS

The staff provide twenty four - hour supervision of the plants and pumping stations. Grounds and equipment maintenance are normally handled during the day shift as are the more comprehensive laboratory analyses.

There were no additions or deletions to the staff during the past year.

Two members of the staff, E. Young and C. Root, obtained satisfactory standing during the year in the second of a series of three courses towards their Certificate of Qualification as a sewage works operator.



CONTROL BUILDING (WEST SIDE PLANT)

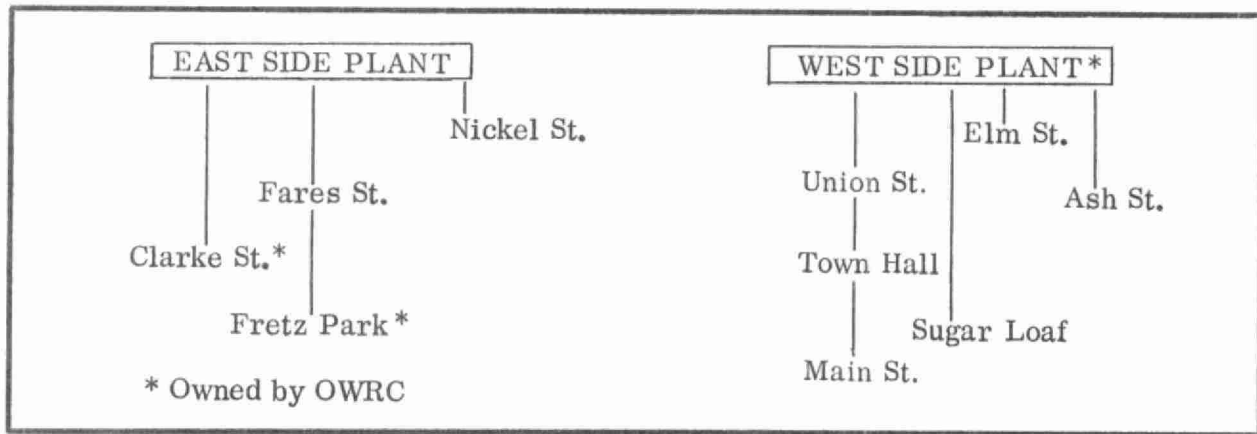
Description of Project

SUMMARY

The geographical location of the Town of Port Colborne and the relatively shallow soil conditions over the underlying bed-rock have resulted in the necessity of two sewage treatment plants and an integrated system of pumping stations. The Welland Canal divides the town into two sections, the east side and the west side. Each side is served by a treatment plant which is served in turn by four pumping stations. The entire project is operated by the OWRC.

The diagrammatic layout indicates the treatment plant and the pumping stations serving each plant. An asterisk behind the name indicates ownership by the OWRC.

The description includes both the west side and each side plants. However, due to the multitude of pumping stations involved in this project, only the two newest, Clark Street and Fretz Park, are described in this report.



WEST SIDE SEWAGE TREATMENT PLANT (KING STREET)

GENERAL

The plant is located at the intersection of King and Keefer Streets. It treats the sewage for the section of the town on the west side of the Welland Ship Canal.

The sewage is pumped to the plant by four outlying pumping stations located at Ash Street, Elm Street, Sugar Loaf Street and near the Town Hall.

INFLUENT WORKS

The waste water enters the plant via a 14 inch diameter inlet sewer, passing through one of two manually cleaned bar screens, into the grit channels.

The bar screens prevent large objects from entering the plant. In the grit channels, the velocity of flow is reduced sufficiently to allow settling of the heavier particles of grit and detritus material which otherwise would damage the plant. These channels are operated alternately to allow cleaning of one while the other is in use.

From the grit channels, the flow passes through a Venturi flume, which measures

the flow entering the plant and into the primary distribution chamber.

PRIMARY SETTLING

The two circular primary settling tanks receive the waste water from the distribution chamber, which proportionately distributes the flow equally between the two tanks.

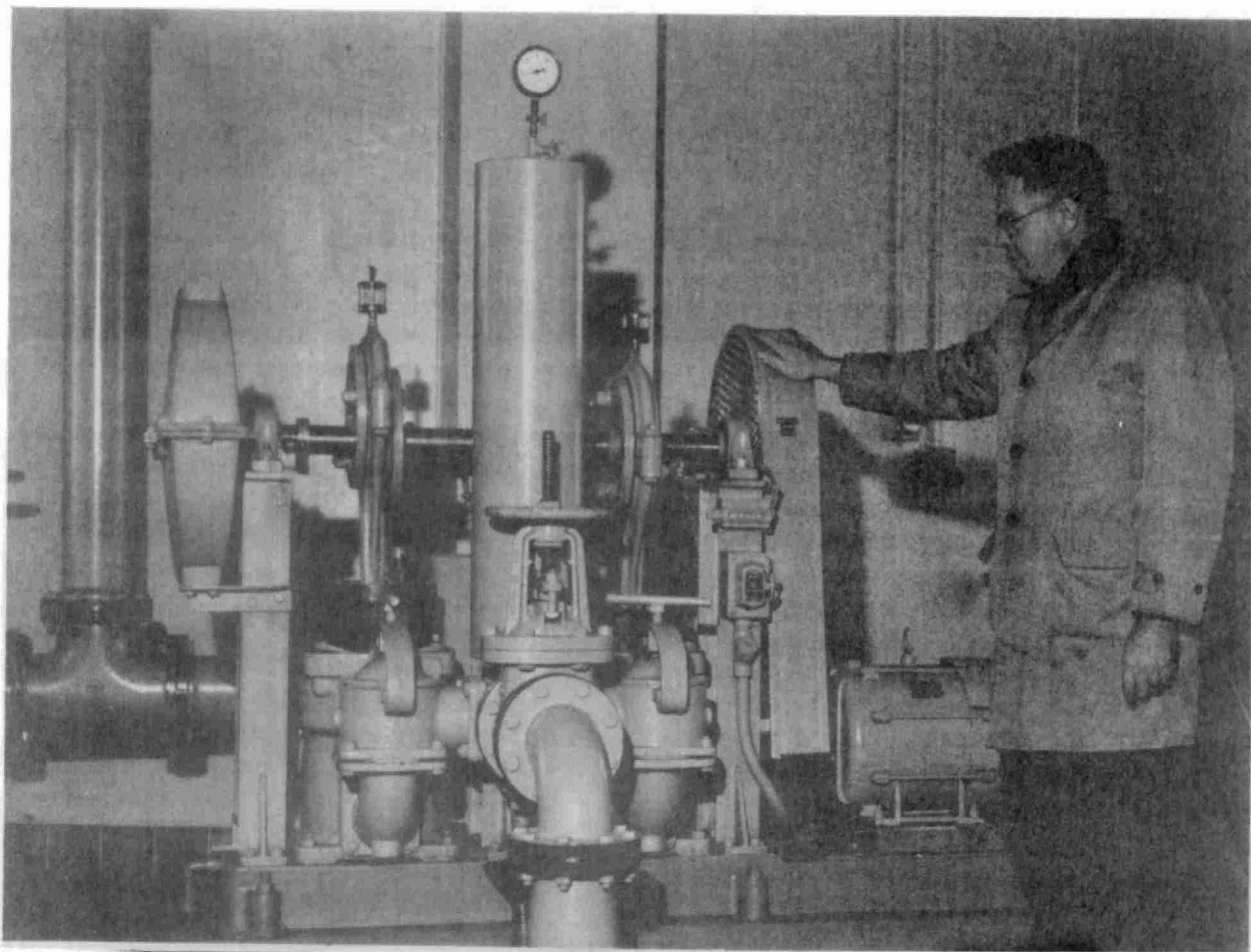
These tanks provide a detention period to the flow and allow the heavier organic material (sludge) to settle for removal. The tanks are equipped with sludge scraping and surface skimming mechanisms which draw off the accumulated sludge and scum, depositing the material in a holding pit from where it is pumped to the primary digester for treatment.

The partially settled flow then passes over the effluent weirs to the aeration tanks.

AERATION

The six aeration tanks provide the biological environment required to remove the finely divided, suspended and dissolved organic materials remaining in the flow.

The settled sludge (activated sludge),



JIM TELFER INSPECTS DIGESTED SLUDGE PUMP AT WEST SIDE PLANT

from the final settling tanks, is recirculated back to the aeration tanks and mixes with the effluent from the primary tanks. The mixed liquor is then aerated by the high intensity aerating cones which supply, by their agitating action, the oxygen requirements of the biological communities of aerobic micro-organisms (sludge floc).

(The activated sludge which is returned, acts as the vehicle for the bacteria which in turn oxidizes the organic material).

The mixed liquor then passes into the final distribution chamber.

FINAL SETTLING

The two circular final settling tanks receive the flow from the distribution

chamber and provide another detention period to the mixed liquor, for removal of the activated sludge. The tanks are equipped with sludge removal facilities which draw off the activated sludge and return it to the aeration tanks or to waste.

The clarified effluent is then discharged over the effluent weirs to the chlorine contact chamber.

CHLORINATION

The chlorine contact chamber provides another short detention period to ensure overall contact with the chlorine, which is piped in from an automatic proportional chlorinator. The chlorine disinfects the effluent by destroying any remaining bacteria.

The effluent is then discharged to the Welland Canal.

DIGESTION

The digestion in this plant is performed in two stages; called primary and secondary digestion.

The sludge from the primary settling tanks along with waste activated sludge is pumped to the primary digester. In the absence of air, and at a temperature of 90 degrees Fahrenheit, the decomposing or digestion process begins. The sludge is broken down by bacterial action to a thick, black, odourless liquid. Constant mixing ensures overall treatment.

The secondary digester receives the digested sludge and completes the process. This digester is not agitated but is left in a quiescent state. The supernatant is decanted and returned to the

treatment process and the settled digested sludge is pumped out and trucked away for disposal.

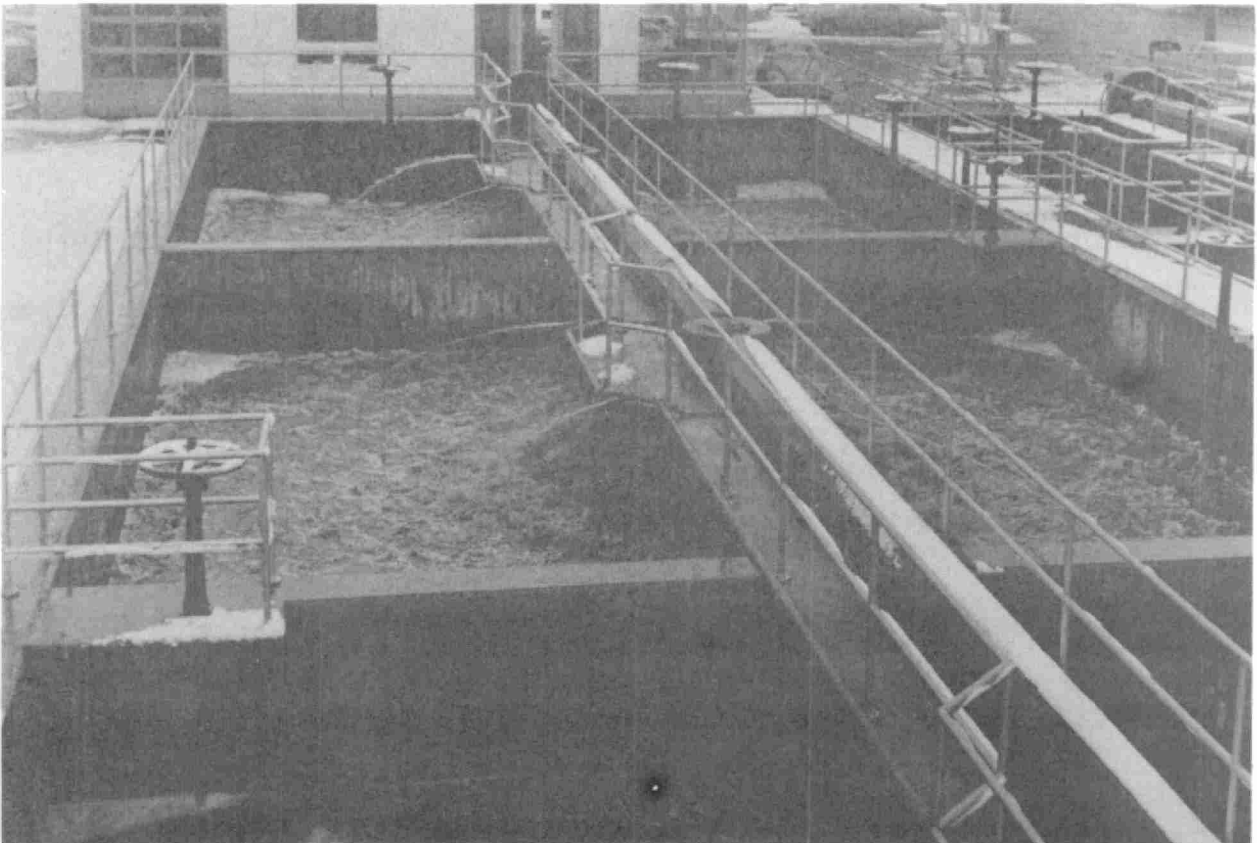
During the digestion process, sludge gas (principally methane) is formed and is used as a fuel for the boiler, supplying heat to the buildings and digesters. Standby fuel is oil.

EAST SIDE SEWAGE TREATMENT PLANT (KILLALY STREET)

GENERAL

The plant is located near the intersection of Killaly Street and Welland Street. It treats the sewage for the section of the town located on the east side of the Welland Ship Canal.

The plant is fed by four outlying pumping stations; Fares Street, Nickel Street, Clarke Street and Fretz Park.



AERATION SECTION AT WEST SIDE PLANT

INFLUENT WORKS

The waste water enters the plant via two 10-inch forcemains passing through one of two manually cleaned bar screens into the grit channels.

The bar screens prevent large objects from entering the plant. In the grit channels the velocity of flow is reduced sufficiently to allow settling of the grit and detritus material which otherwise would damage the plant. These channels are operated alternately to allow cleaning of one while the other is in use.

The flow then passes through a comminutor which further screens the sewage and cuts the screenings into fine particles. It then passes through the screen openings and to the aeration section.

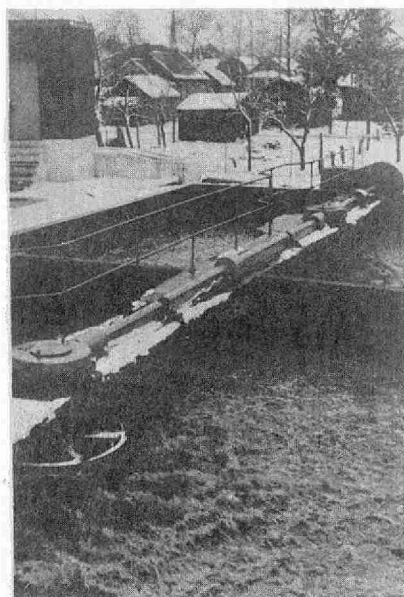
The sewage flow is measured as it passes through a Parshall flume.

AERATION

The four aeration tanks during a detention period provide a biological environment as was described for the King Street plant. The mixed liquor then flows to the final settling tanks.

FINAL SETTLING

Two circular final settling tanks receive the flow and provide another detention period for the removal of activated



AERATION SECTION, EAST SIDE PLANT

sludge. The tanks are equipped with sludge removal facilities which return the activated sludge to the aeration tanks or waste. The clarified effluent then discharges over the weirs.

DIGESTION

The digestion in this plant is carried out in one stage.

The waste activated sludge is pumped into the digester. In the absence of air, and at a temperature of 90 degrees Fahrenheit, the decomposition and digestion takes place.

The supernatant is decanted and returned to the plant and the digested sludge is hauled away by tank truck.

CLARKE STREET PUMPING STATION

GENERAL

This pumping station is located on Clarke Street between Russell Avenue and Killaly Street East and serves the north-east section of the town. Sewage is collected in the wet well at the station and is delivered via a forcemain to the influent channel at the East Side plant.



RETURN SLUDGE PUMPS (WEST SIDE PLANT)

EQUIPMENT

This station is equipped with three stereophagus pumps which may operate singly or in parallel depending upon the flow of sewage into the station. These pumps are equipped with a conical impeller and combine a shredding and pumping operation which eliminates the need of comminution facilities at the East Side plant.

The pumps operate on a simple on-off basis and are controlled by the level in the wet well, this level being sensed by electrodes set at appropriate elevations.

There is no standby power in the event of a local electric power failure. To avoid surcharging of the sewers in such an instance, an overflow pipe has been provided leading from the wet well to a nearby ditch.

FRETZ PARK PUMPING STATION

GENERAL

Located on Johnston Street between

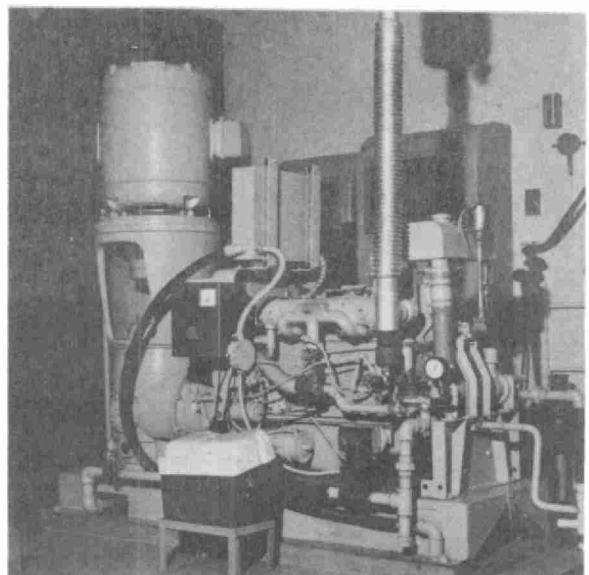
James and Mercury Avenue, this pumping station serves the southeast section of the town. Sewage is collected in the wet well at the station and is delivered via a forcemain to the influent channel at the East Side plant.

EQUIPMENT

This station is equipped with two stereophagus pumps which may operate singly or in parallel depending upon the flow of sewage. These pumps, as do those in the Clarke Street station, combine a shredding and pumping operation. The pumps are controlled by electrodes located in the wet well.

In the event of a power failure, rather than an overflow pipe as is provided at the Clark Street station, a standby natural gas engine has been installed. This engine starts automatically in the event of an interruption in the local hydro and by means of a right angle drive mechanism, serves as power to one pumps until service is resumed.

PUMP AND STANDBY ENGINES AT
FRETZ PARK PUMPING STATION



PROJECT COSTS

59-5-47

NET CAPITAL COST (Final)	
Long Term Debt to OWRC	<u>\$625,008.36</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	<u>\$ 55,949.19</u>
Net Operating	\$ 64,498.43
Debt Retirement	12,613.00
Reserve	3,973.16
Interest Charged	35,067.35
TOTAL	<u>\$116,151.94</u>

RESERVE ACCOUNT

Balance at January 1, 1965	\$ 14,895.88
Deposited by Municipality	3,973.16
Interest Earned	909.64
Less Expenditures	-
Balance at December 31, 1965	<u>\$ 19,778.68</u>

60-S-73

NET CAPITAL COST (Final)	\$325,199.95
DEDUCT - Portion Financed by CMHC (Final)	47,154.39
Long Term Debt to OWRC	<u>\$278,045.56</u>
 Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965	 <u>\$ 31,935.15</u>
 Net Operating	 \$ 107.43
Debt Retirement	10,088.00
Reserve	2,206.46
Interest Charged	15,600.32
TOTAL	<u>\$ 28,002.21</u>

RESERVE ACCOUNT

Balance at January 1, 1965	\$ 5,016.47
Deposited by Municipality	2,206.46
Interest Earned	324.65
	\$ 7,547.58
 Less Expenditures	 -
Balance at December 31, 1965	<u>\$ 7,547.58</u>

62-5-108

NET CAPITAL COST (Final)		\$291, 992. 10
DEDUCT - Portion Financed by CMHC (Final)	\$78, 293. 33	
- Payments from Municipalities	<u>\$87, 025. 24</u>	\$165, 318. 57
Long Term Debt to OWRC		<u>\$126, 673. 53</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1965		\$ <u>9, 742. 29</u>
Net Operating		\$ 149. 57
Debt Retirement		4, 605. 00
Reserve		1, 495. 71
Interest Charged		7, 121. 93
TOTAL		\$ <u>13, 372. 21</u>

RESERVE ACCOUNT

Balance at January 1, 1965	\$ 1, 558. 29
Deposited by Municipality	1, 495. 71
Interest Earned	118. 62
	<u>3, 172. 62</u>
Less Expenditures	-
Balance at December 31, 1965	\$ <u>3, 172. 62</u>

MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER
JAN	3991.35	2943.72		124.96		224.03	388.70		55.47	161.13	93.34
FEB	4734.41	2943.72	68.25	159.06	804.80		369.16	59.02	80.93	249.47	
MARCH	5881.57	3273.23		291.45	833.80		463.44		56.36	963.29	
APRIL	4556.31	3421.33		111.46	811.36		60.00		14.21	137.95	
MAY	6483.67	4592.25		60.86	836.85	224.03	275.66		79.89	329.54	84.59
JUNE	4646.44	3061.50	48.00	16.26	667.31		164.23	60.00	49.08	580.06	
JULY	6171.97	3109.09	203.25	5.52	632.19	224.03	493.84	966.66	512.39	25.00	
AUG	5578.47	3098.12	228.00	29.91	1289.02		448.08	65.70		308.55	111.09
SEPT	4910.86	3108.95	185.31	345.15	654.72	224.02	285.87	44.29	127.12	(64.57)	
OCT	6644.06	4692.99		12.26	770.73	224.03	312.95	17.65	224.79	388.66	
NOV	5009.92	3330.54		195.56	815.84		385.27		17.94	139.80	124.97
DEC	5889.40	3229.33		58.58	782.13	224.03	342.28	325.47	478.43	449.15	
TOTAL	64498.43	40804.77	732.81	1411.03	8898.75	1344.17	3989.48	1538.79	1696.61	3668.03	413.99

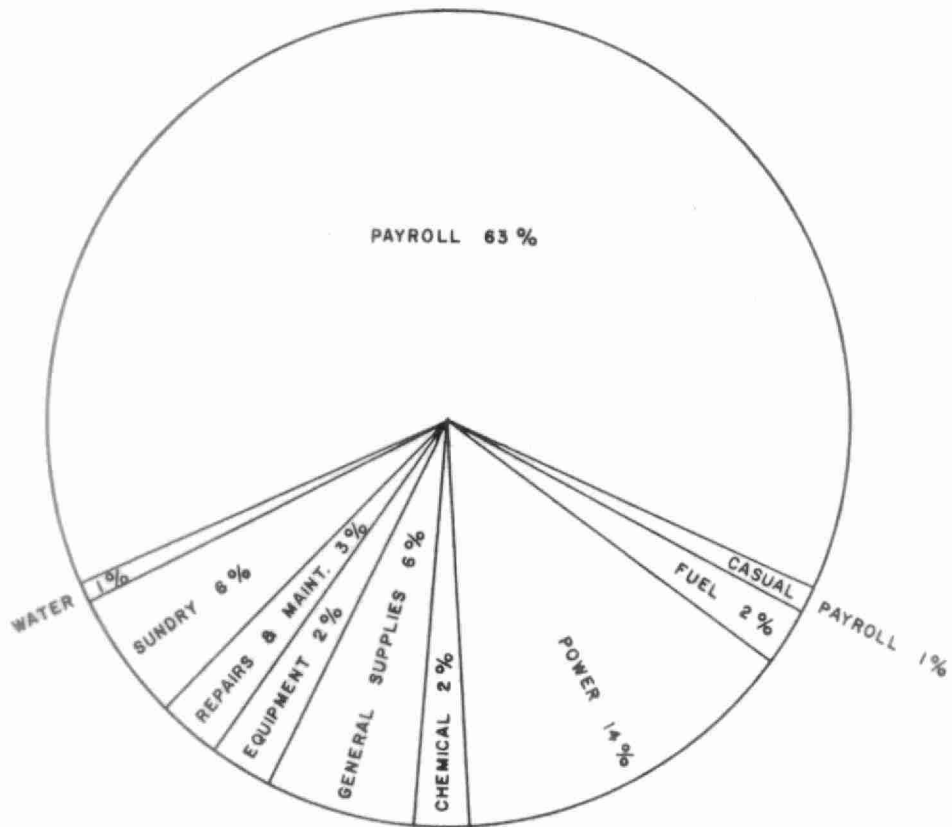
* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$1556.35
BRACKETS INDICATE CREDIT

YEARLY OPERATING COSTS

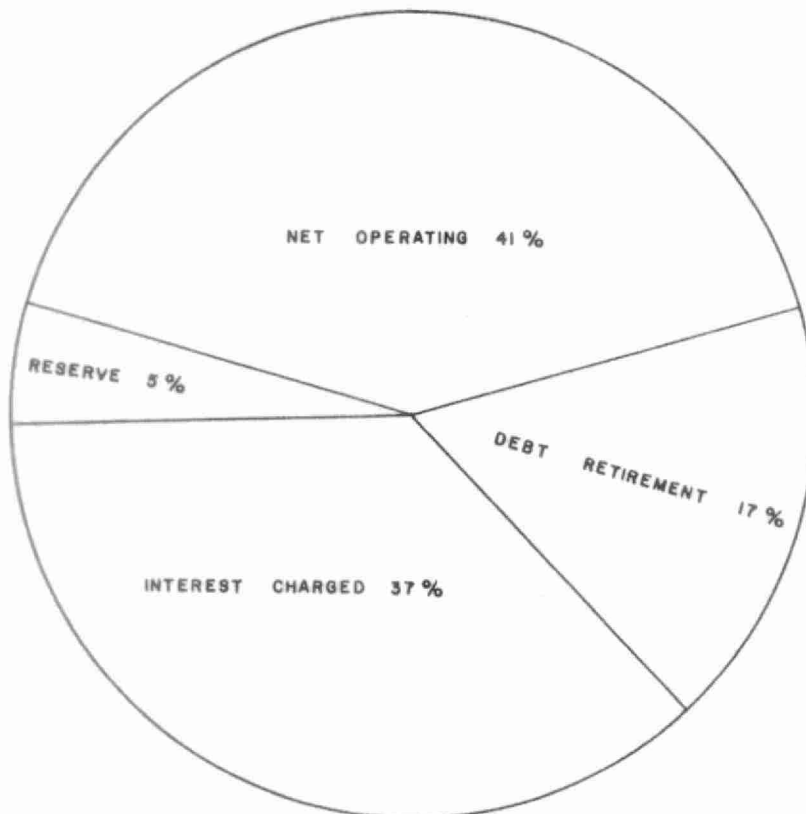
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1962	297.053	\$56400.48	* \$ 14.70	\$ 189.86	22 CENTS
1963	336.397	60754.91	15.72	180.60	21 CENTS
1964	425.527	57818.45	12.95	135.88	17 CENTS
1965	731.513	64498.43	14.59	88.17	11 CENTS

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

1965 OPERATING COSTS

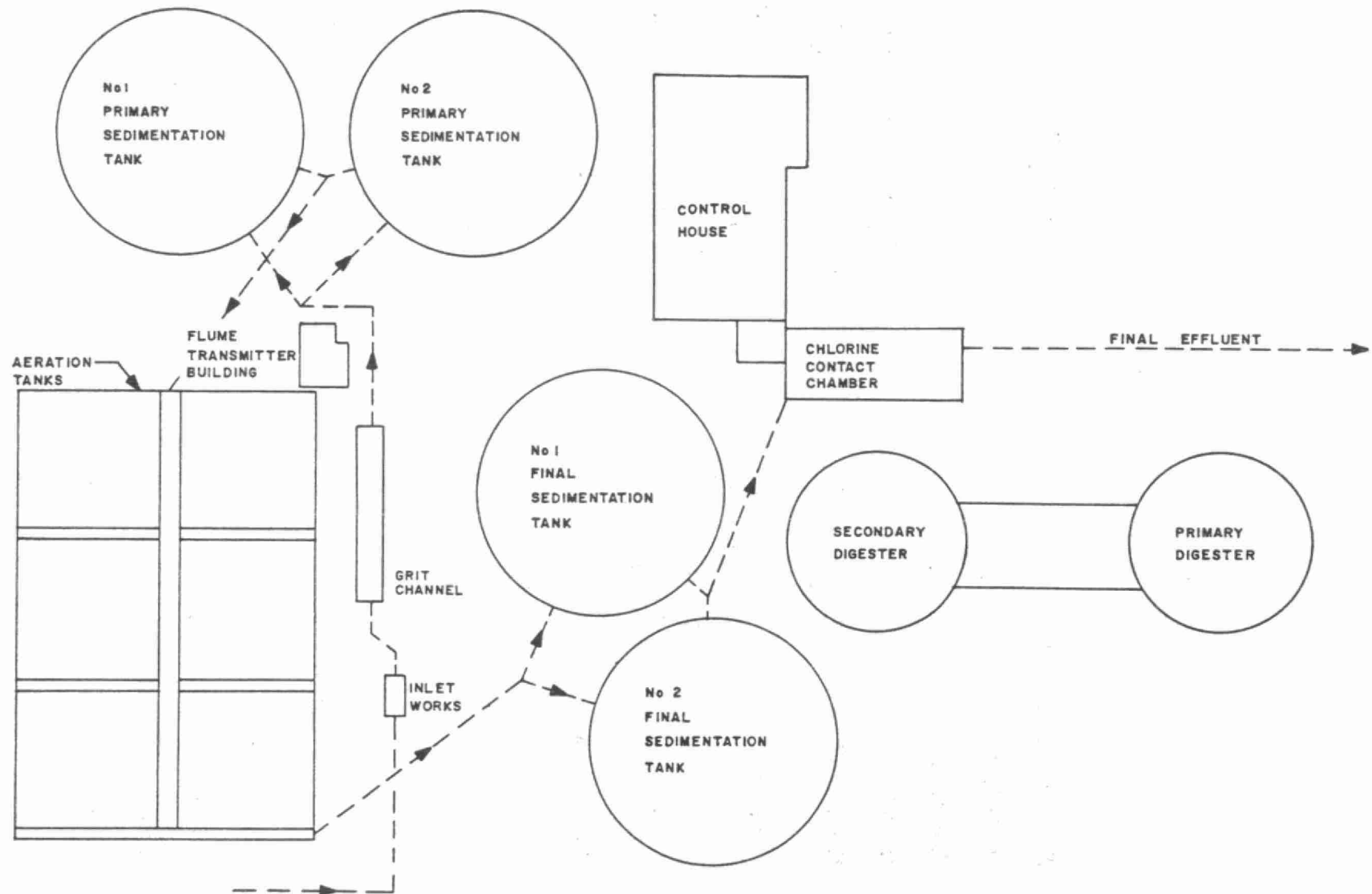


TOTAL ANNUAL COST (ALL PROJECTS)



**Technical
Section**

FLOW CHART WEST SIDE PLANT



Design-Data

WEST SIDE PLANT

GENERAL

Type of Plant - Activated sludge process.

Design Population - 9,000 persons.

Per Capita Flow - 100 gallons per capita per day.

Design Plant Flow - Dry weather flow
900,000 gallons
per day (DWF).
Combined flow is
3,600,000 gallons
per day (4 DWF).

Five Day BOD -

Raw Sewage - 225 PPM

Removal - 93%

Suspended Solids -

Raw Sewage - 300 PPM

Removal - 93%

INFLUENT SEWER

14 inch diameter forcemain.

SCREENS

Located before the grit channels and

manually cleaned. Two bar screens with 1 inch spaces,

GRIT CHANNELS

Two parallel units.

Length - 40 ft. 4 in. - Width - 1 ft. 10 in.

Cross-Section area - 1.67 square feet.

Volume - 67.3 cubic feet = 419 gallons.

Detention at Design Flow (DWF) - 0.67 minutes.

Velocity - 1 ft. per second.

A grit trough is provided which discharges to a wheelbarrow.

PRIMARY SEDIMENTATION TANKS

Two units, circular.

Size - 50 ft. diameter by 9 ft. liquid depth.

Volume (2 units) - 35,300 cubic feet = 220,000 gallons.

Detention at Design Flow - 5.9 hours.

Surface Settling Rate - 229 gallons per square foot of tank per day.

Weir Overflow Rate - 2860 gallons per lineal foot of weir per day.

Equipment - Dorr-Oliver-Long Limited.

RAW SLUDGE PUMPS

Two - Carter plunger type 75 GPM at a TDH of 30 feet and driven by 3 HP General Electric motors.

AERATION SECTION

Type - surface aeration.

Six units square.

Size of Each Unit - 30 ft. x 30 ft. x 10.5 ft. (normal W. L.)

Volume (6 units) - 52,300 cubic feet = 326,000 gallons.

Detention at Design Flow = 8.7 hours.

Detention at Design Flow - 6.7 hours (including 30% return sludge).

BOD Loading - 26 lbs. BOD per day per 1,000 cubic feet of aerator (assuming 35% BOD reduction in the primary).

Equipment - Ames Crosta Mills Limited.

FINAL SEDIMENTATION TANKS

Two units, circular.

Size - 45 ft. diameter by 8 ft. liquid depth.

Volume (2 units) - 25,500 cubic feet = 159,500 gallons.

Detention at Design Flow - 4.24 hours.

Surface Settling Rate - 282 gallons per square foot of tank per day.

Weir Overflow Rate - 3,200 gallons per lineal foot of weir per day.

Equipment - Ames Crosta Mills Limited.

ACTIVATED SLUDGE PUMPS

Three - Ames Crosta pumps rated at 315 GPM at a TDH of 30 feet and driven by 7.5 HP Brooks Huddersfield motors.

CHLORINE CONTACT CHAMBER

One unit - rectangular

Volume - 16,060 cubic feet = 100,000 gallons.

Contact Period at Design Flow - 16 minutes.

CHLORINATORS

Storm Flow Chlorinator - Wallace and Tiernan series A-731, V-notch.

Main Flow Chlorinator - Wallace and Tiernan series A-731, V-notch.

Maximum capacity of each chlorinator is 400 lbs. of chlorine per day.

DIGESTERS

Two units, one heated circular primary with fixed cover and one unheated circular secondary with floating cover. Size of Primary - 35 ft. diameter by 22 ft. depth.

Volume of Primary - 21,200 cubic feet. Capacity of Primary - 2.34 cubic feet per capita.

Mixing of Primary - Dorr draft tube mixer.

Operating Temperature - for the primary is 90° - 95° F. accomplished by a spiral heat exchanger.

Size of Secondary - 30 ft. diameter by 19 ft. depth.

Volume of Secondary - 13,400 cubic feet. Capacity of Secondary - 1.49 cubic feet per capita.

Loading (2 units) - 2.18 lbs. of solids per cubic feet of tank per month.

Equipment - Dorr-Oliver-Long Limited.

HEAT EXCHANGER

One No. 25 spiral heat exchanger manufactured by Dorr-Oliver capable of transferring 200,000 BTU's per hour from the hot water to the sludge.

SLUDGE RECIRCULATING PUMPS

Two - Wemco sludge recirculating pumps rated at 62.5 GPM at a TDH of 40 feet driven by 5 HP General Electric motors.

SLUDGE TRANSFER PUMP

One Carter duplex plunger pump rated at 125 GPM.

MISCELLANEOUS EQUIPMENT

Boiler is a Cleaver-Brooks, rated at 500,000 BTU's per hour, operating on digester gas with natural gas standby.

Boiler Water Recirculating Pump - Ingersoll 33.4 GPM at a TDH of 32 feet driven by a 3/4 HP Doerr electric motor.

Building Hot Water Circulating Pump - Armstrong, 1 1/2 inch, driven by a 1/6 HP motor.

Froth Spray Pump - driven by a Westinghouse 10 HP motor.

Digester Building Sump Pump - 1 Smart-Turner 20 GPM at a TDH of 20 feet driven by a 1/2 HP General Electric motor.

Administration Building Sump Pump - 1 Smart-Turner 20 GPM at a TDH of 20 feet driven by a 1/2 HP General Electric motor.

Digester Gas Booster Pump - 1 Rootes-Connersville positive displacement pump driven by a 1/2 HP General Electric motor.

FLOW MEASUREMENT

Main sewage flow.
Sewage to aeration.
Total activated sludge.
Return activated sludge.

DESIGN DATA - EAST SIDE PLANT

GENERAL

Type of Plant - Activated sludge without primary tanks.

Design Plant Flow - 850,000 gallons per day.

GRIT CHANNELS

Two parallel channels, 15 ft. long. Each channel equipped with bar screens at the head of the channel.

COMMINUTION

One comminutor - Jones Atwood Limited with a .75 HP motor.

AERATION SECTION

Four units, square. Each unit 30 ft. x 30 ft. x 16 ft.

Volume (four units) 44,200 cubic feet = 276,000 gallons.

Retention period - 7.8 hours.

Retention period - 6.0 hours (30% return sludge).

Equipment - Ames Crosta Mills Limited.

FINAL SEDIMENTATION TANKS

Two units, circular. Each unit 30 ft. diameter x 8 ft.

Volume (two units) 11,300 cubic feet = 70,400 gallons.

Retention period - 2.0 hours.

Surface Settling Rate - 601 gallons per square foot of tank per day.

Weir Overflow Rate - 4,520 gallons per lineal foot of weir per day.

Equipment - Ames Crosta Mills Limited.

ACTIVATED SLUDGE PUMPS

Three - Ames Crosta Mills with 3 HP motors.

DIGESTER

One unit, circular, single stage.

Size - 50 ft. diameter x 22 ft. 10 in. depth or SWD.

Volume - 44,800 cubic feet = 280,000 gallons.

Heated sludge is recirculated to maintain a temperature of approximately 90° F.

Equipment - Pacific Flush Tank.

SLUDGE RECIRCULATION PUMP

One - Fairbanks-Morse 250 GPM at 35 ft. head with a 3 HP motor.

MISCELLANEOUS EQUIPMENT

One - Water circulating pump = Armstrong with 6 HP motor.

Two - Sludge pumps - Smart-Turner 100 GPM at 27 ft. head with 3 HP motors.

FLOW MEASUREMENTS

Raw sewage meter.

Return sludge meter.

CLARKE STREET PUMPING STATION

PUMPS

Three Pulsometer vertical spindle stereophagus.

CAPACITY

No. 1 - 600 GPM at 70 ft. TDH.

No. 2 - 600 GPM at 70 ft. TDH.

No. 3 - 250 GPM at 27 ft. TDH.

MOTORS - 2

Two - 30 HP Bull.

One - 7.5 HP Bull.

CONTROLS

"Noflote" electrodes.

FRETZ PARK PUMPING STATION

PUMPS

Two Pulsometer vertical spindle stereophagus pumps.

CAPACITY

No. 1 - 750 GPM at 65 ft. TDH.

No. 2 - 750 GPM at 65 ft. TDH.

MOTORS

Two - 30 HP Bull.

CONTROLS

"Noflote" electrodes.

STANDBY ENGINE

Waukesha - Model XA-HU

Fuel is natural gas.

Process Data

GENERAL

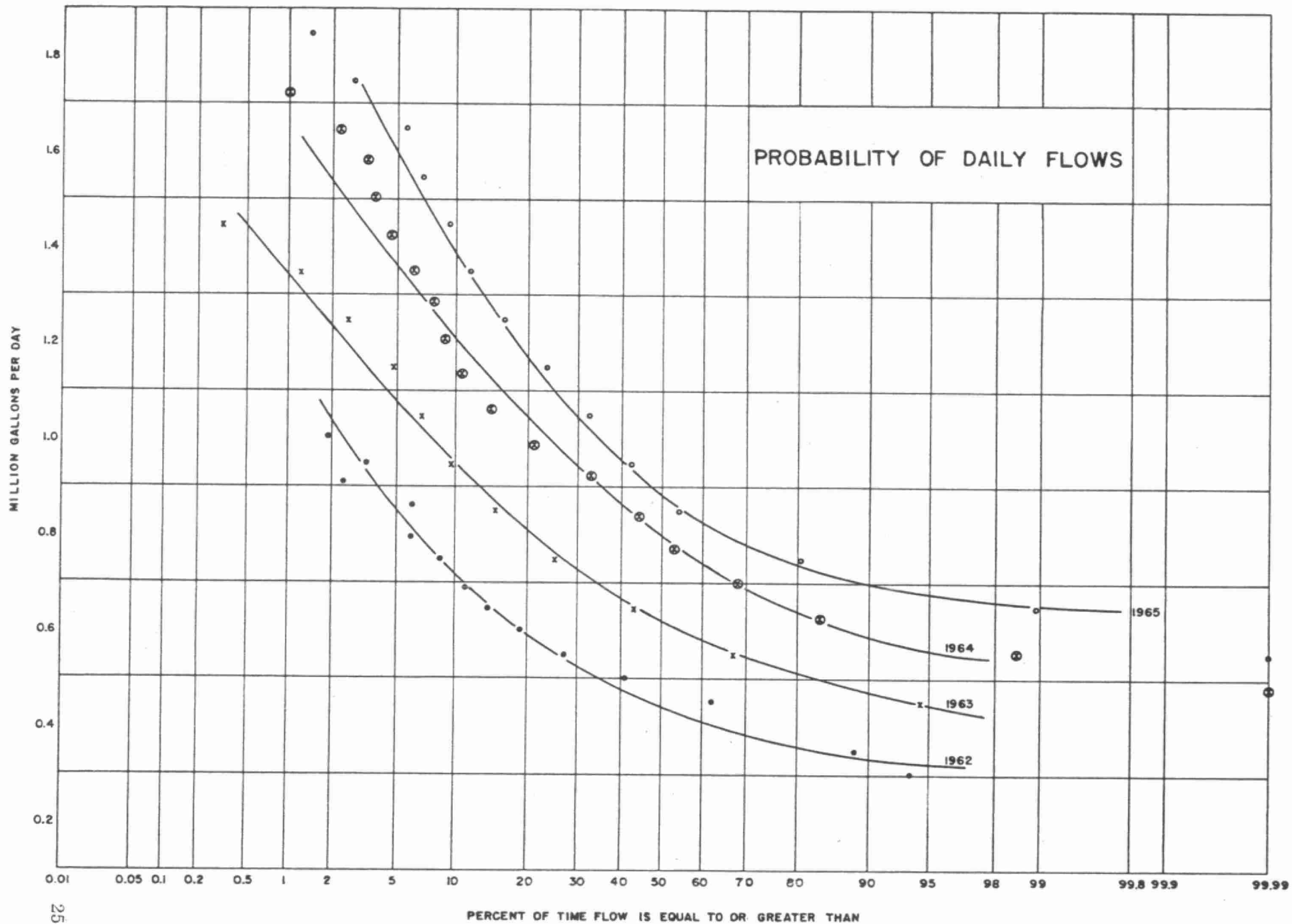
The following data provide information regarding the flows treated by the two Port Colborne Water Pollution Control Plants, the degree of treatment achieved, the digester performance and in the case of the West Side Plant the chlorine dosages required to maintain certain residuals.

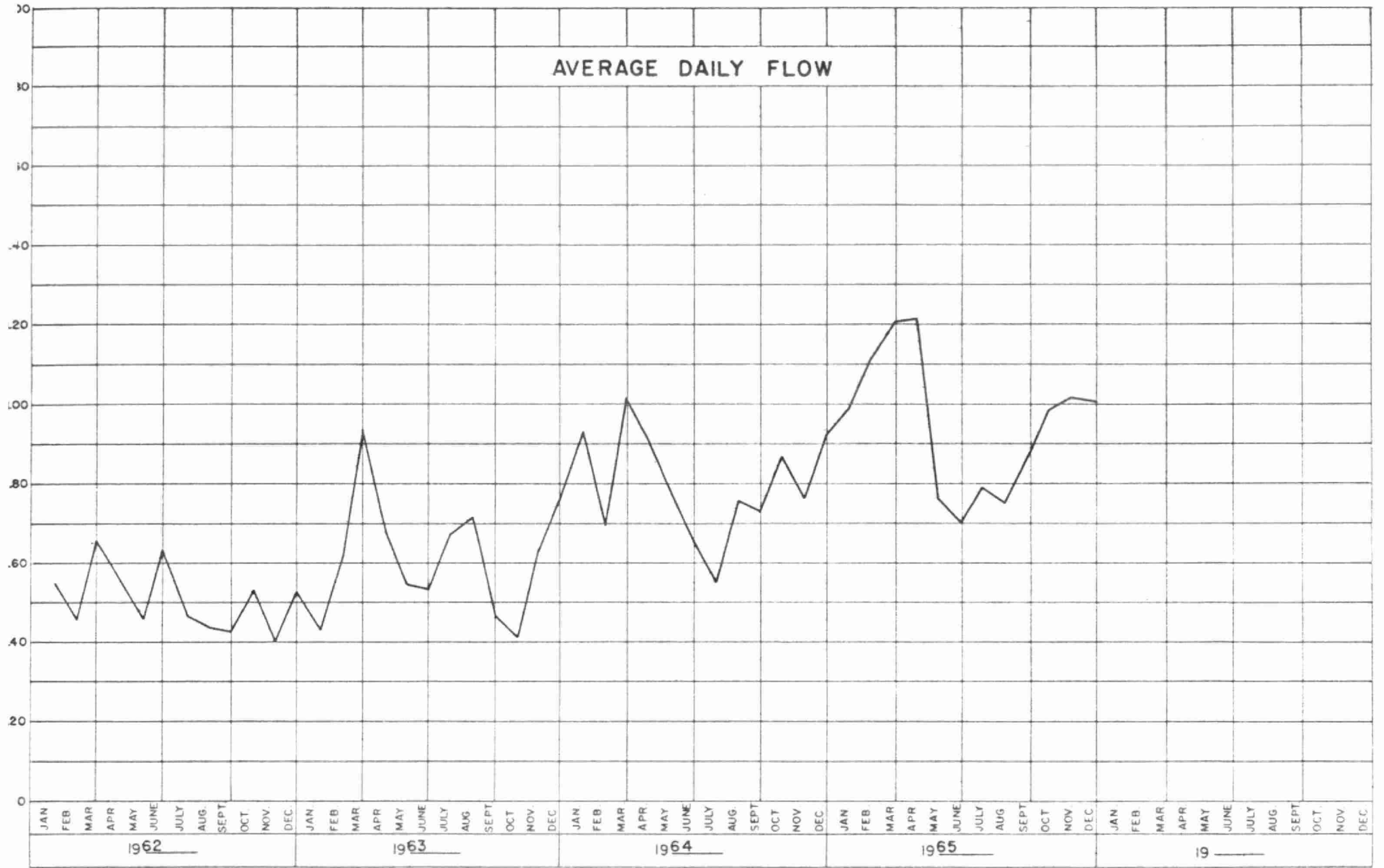
FLOW -- WEST SIDE PLANT

During 1965 a total of 346,084 million gallons of sewage was given secondary treatment. This is an increase of approximately 17.6% over the 1964 flow. The average daily flow of 0.948 million gallons is slightly over the design dry weather hydraulic capacity of the plant.

The maximum 24 hour daily flow of 1.81 million gallons reaching the treatment plant occurred in February and the maximum average daily flow for one month of 1.21 million gallons occurred in the month of March.

The following table and two graphs summarize the flow data for the West Side Plant. It can be seen from the probability plot on page 25, that the plant theoretically was hydraulically overloaded approximately 48% of the time. This overloading however is not seriously affecting the degree of treatment as will be seen later in this report.

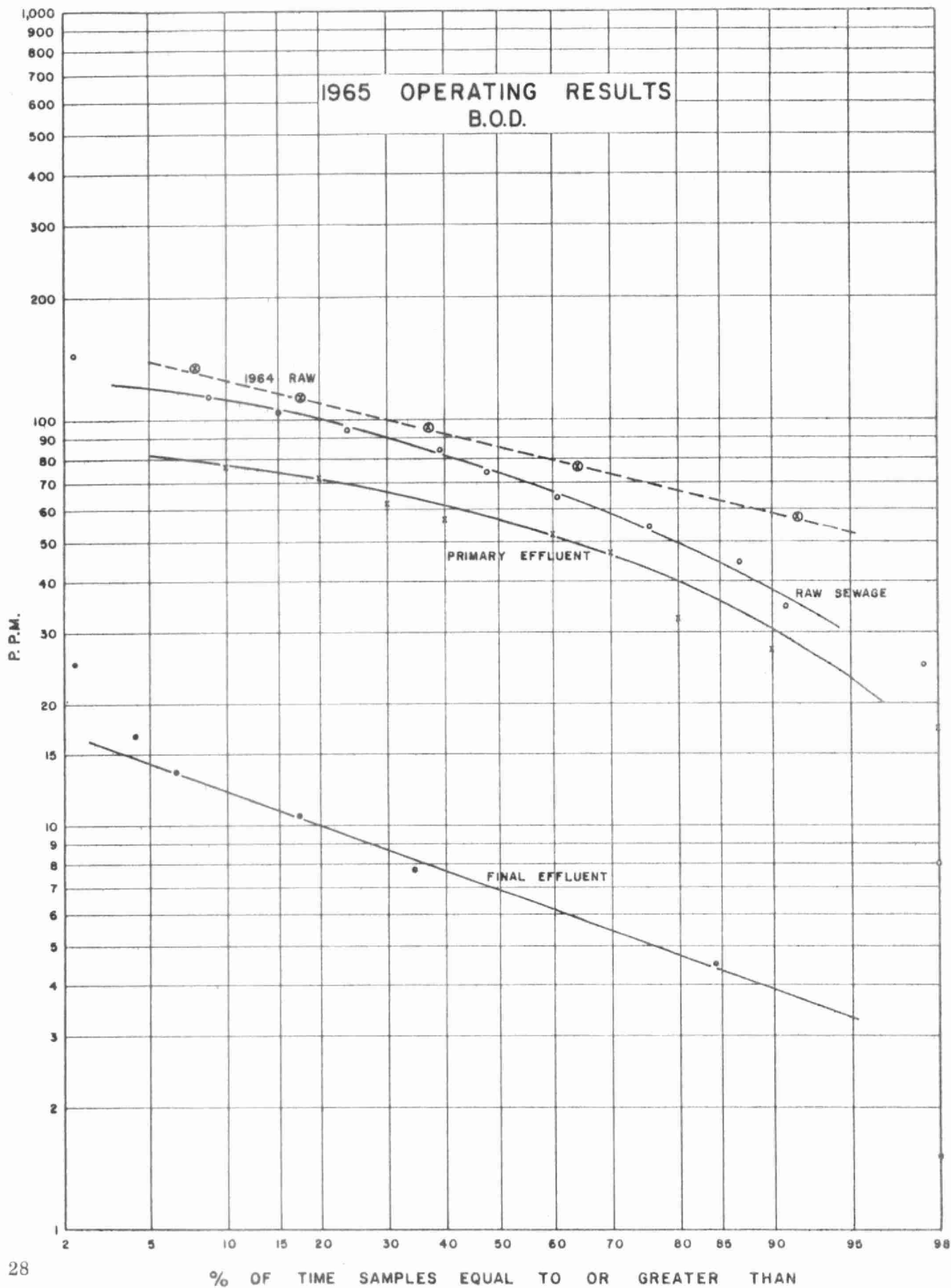


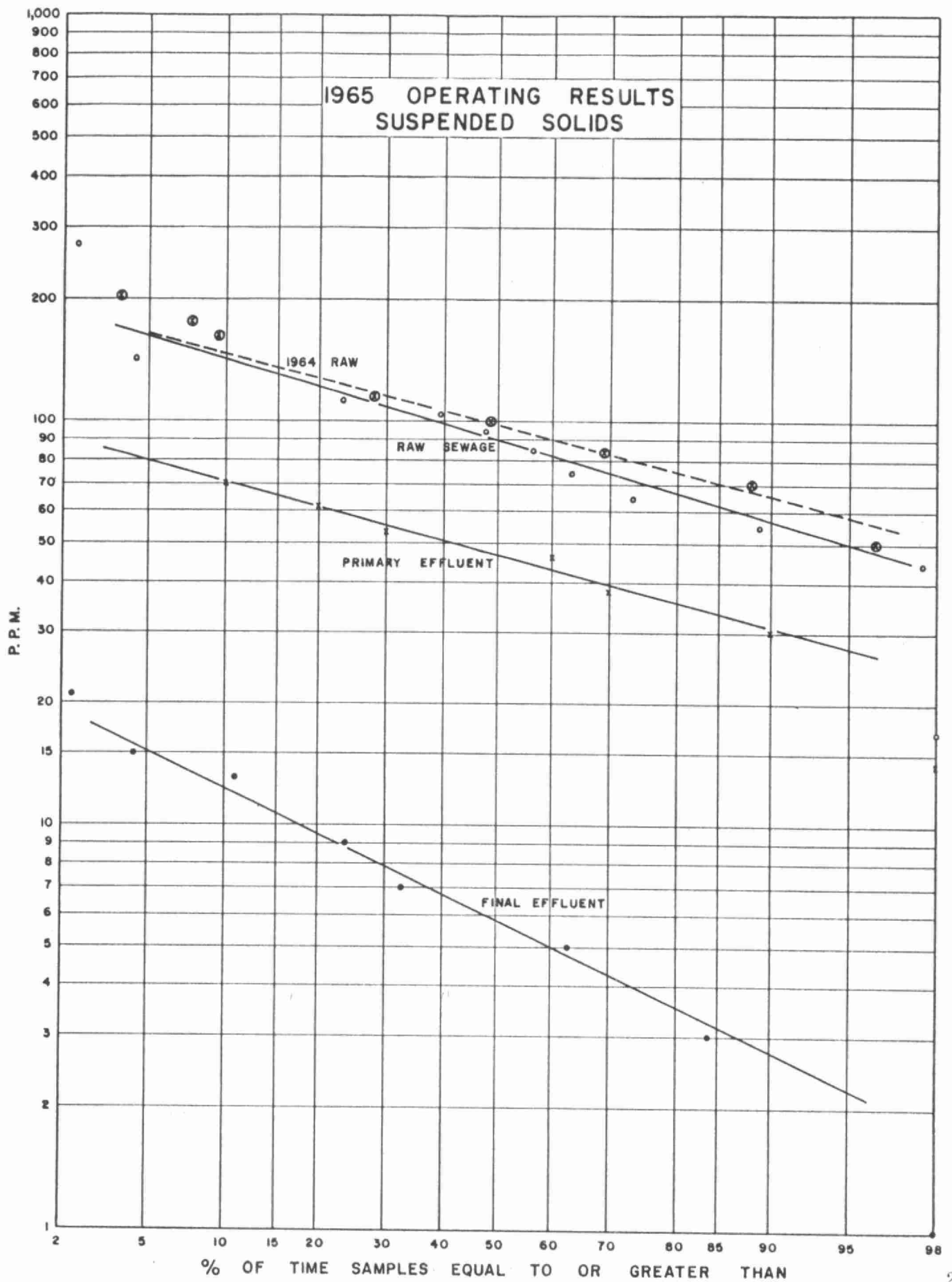


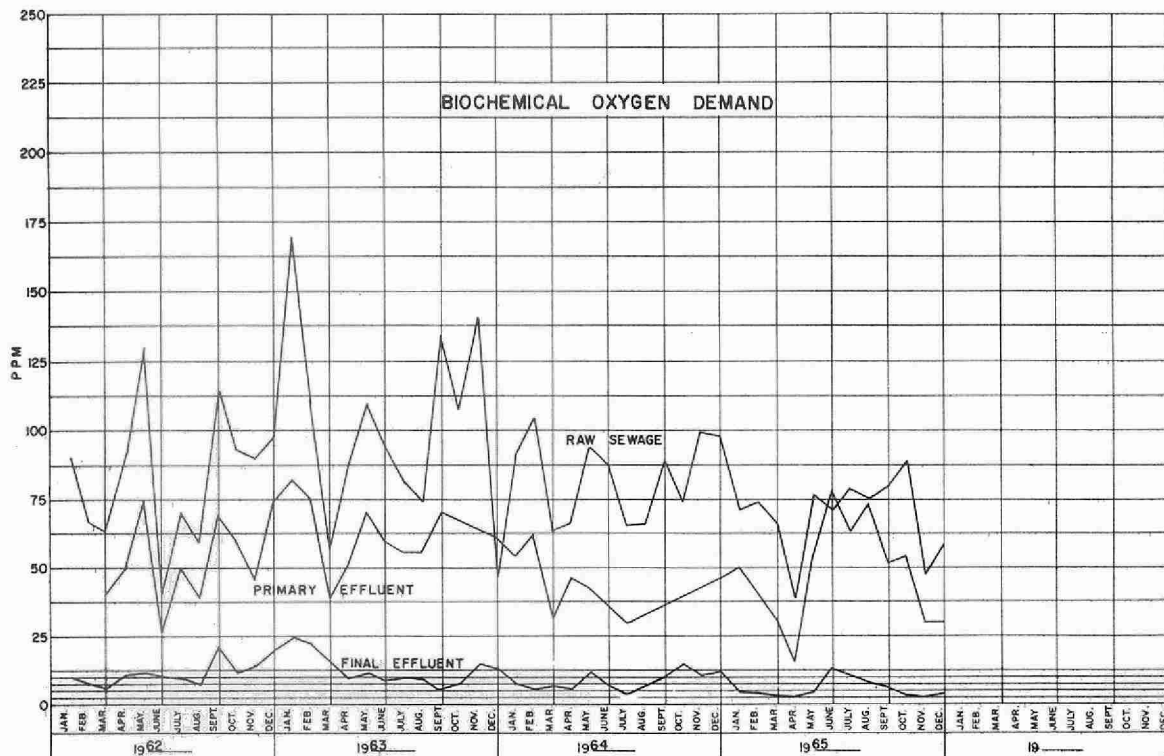
FLOW SUMMARY

(WEST SIDE PLANT)

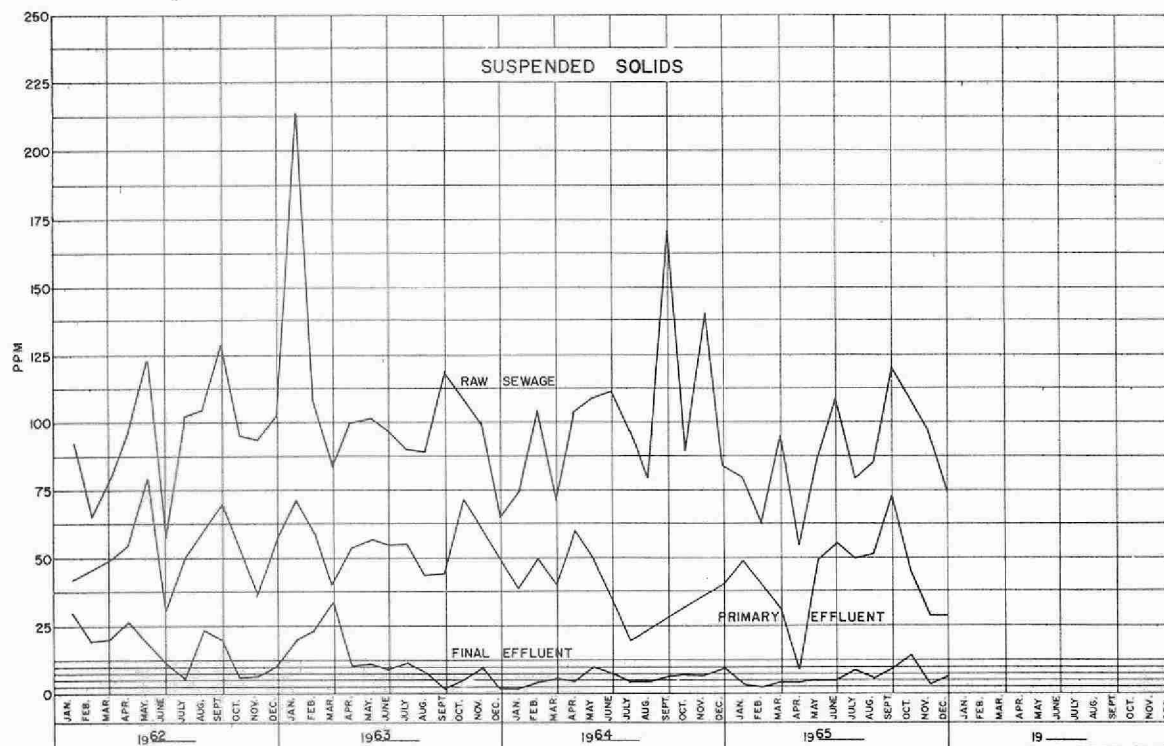
Month	Total Flow MG	Max. Day Flow MG	Max. Rate Flow MG	Min. Day Flow MG
January	30.717	1.567	1.825	.645
February	31.282	1.810	1.800	.723
March	37.465	1.785	1.600	.875
April	36.582	1.644	1.800	.786
May	23.807	1.108	1.200	.603
June	21.392	.992	1.800	.637
July	24.666	1.132	1.300	.631
August	23.413	1.295	1.400	.631
September	22.801	1.143	3.200	.573
October	27.404	1.656	1.800	.629
November	33.521	1.657	2.600	.549
December	33.034	1.718	2.100	.747
Total	346.084			
Average	28.840			







MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	71	4.8	93.0	10.2	80	3	96.0	11.8	18
FEB.	74	4	94.5	10.9	63	2	97.0	9.5	8
MAR.	66	3.6	94.5	11.7	95	4	95.5	17.0	6
APR.	39	2.9	92.5	6.6	54	4	92.5	9.1	4
MAY	71	4	94.5	8.0	86	5	94.0	9.6	4
JUNE	92	13	86.0	8.4	109	5	95.5	11.1	4
JULY	65	11	83.0	6.7	78	8	89.5	8.6	-
AUG.	67	8	88.0	6.9	85	6	93.0	9.2	-
SEPT.	104	6.7	93.5	11.1	132	9	93.0	14.0	14
OCT.	95	3	97.0	12.6	108	14	87.0	12.9	-
NOV.	45	6	86.5	6.5	94	8	91.5	14.4	13
DEC.	68	8	88.0	9.9	71	12	83.0	9.7	-
TOTAL	-	-	-	112.5	-	-	-	140.2	71
AVG.	71	6	91.5	9.4	88	7	92.0	11.7	6

COMMENTS

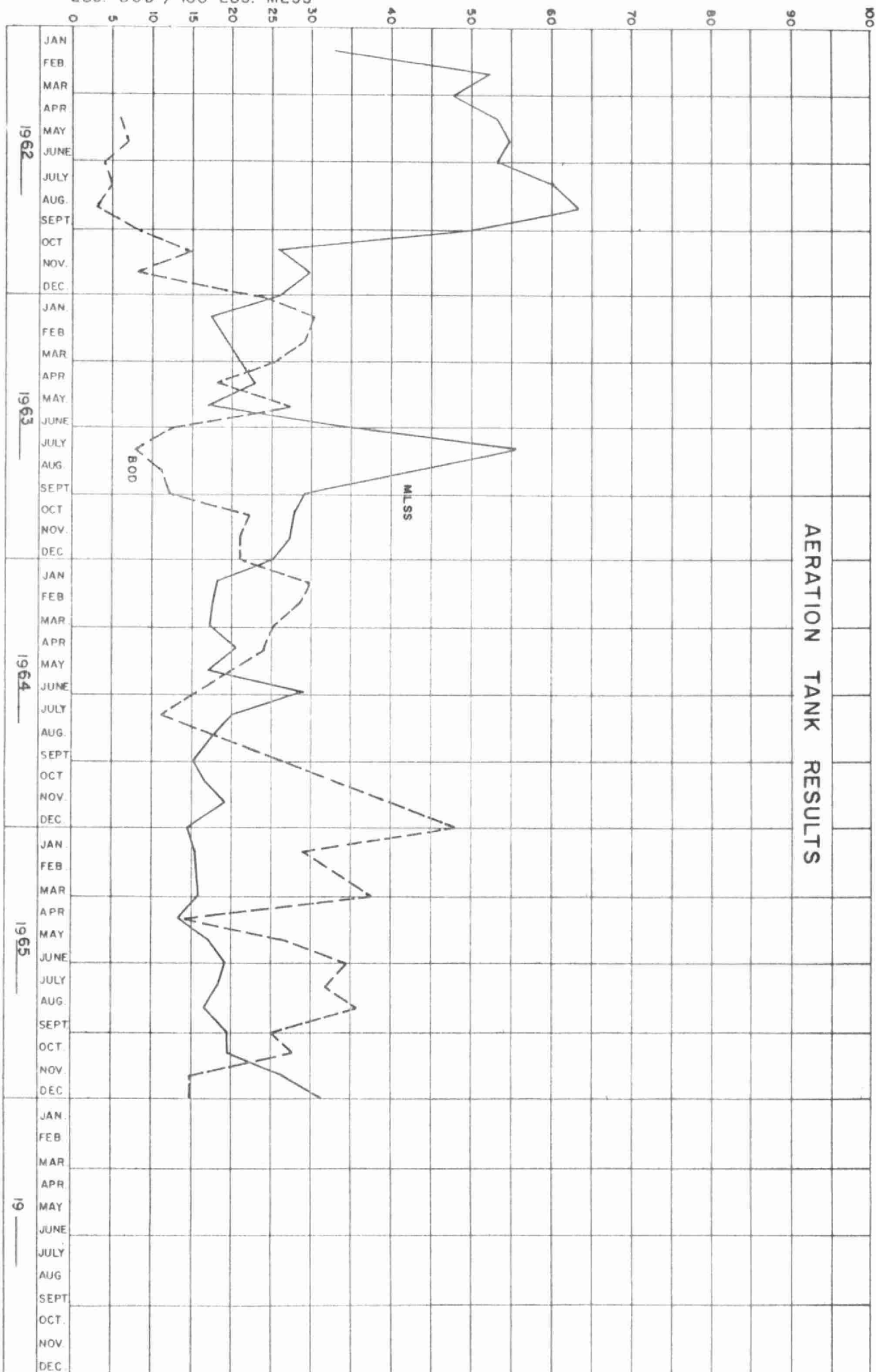
The biochemical oxygen demand (BOD) and suspended solids (SS) of the raw sewage received at the West Side Plant are once again below normal for domestic sewage. In fact the average strength of the raw sewage in 1965 was reduced from the 1964 average values. Because of these low loadings, the plant is capable of handling hydraulic loadings which exceed the DWF design for the plant.

The average removal efficiencies of 91.5% BOD and 92.0% SS are adequate when considering the relative strength of raw sewage. An average BOD of 6 ppm and SS of 7 ppm in the effluent are well within OWRC objectives of 15 ppm.

The grit removed from the sewage is very low. This is quite often the case however in systems where all sewage is pumped.

AERATION TANK RESULTS

LBS. BOD / 100 LBS. MLSS

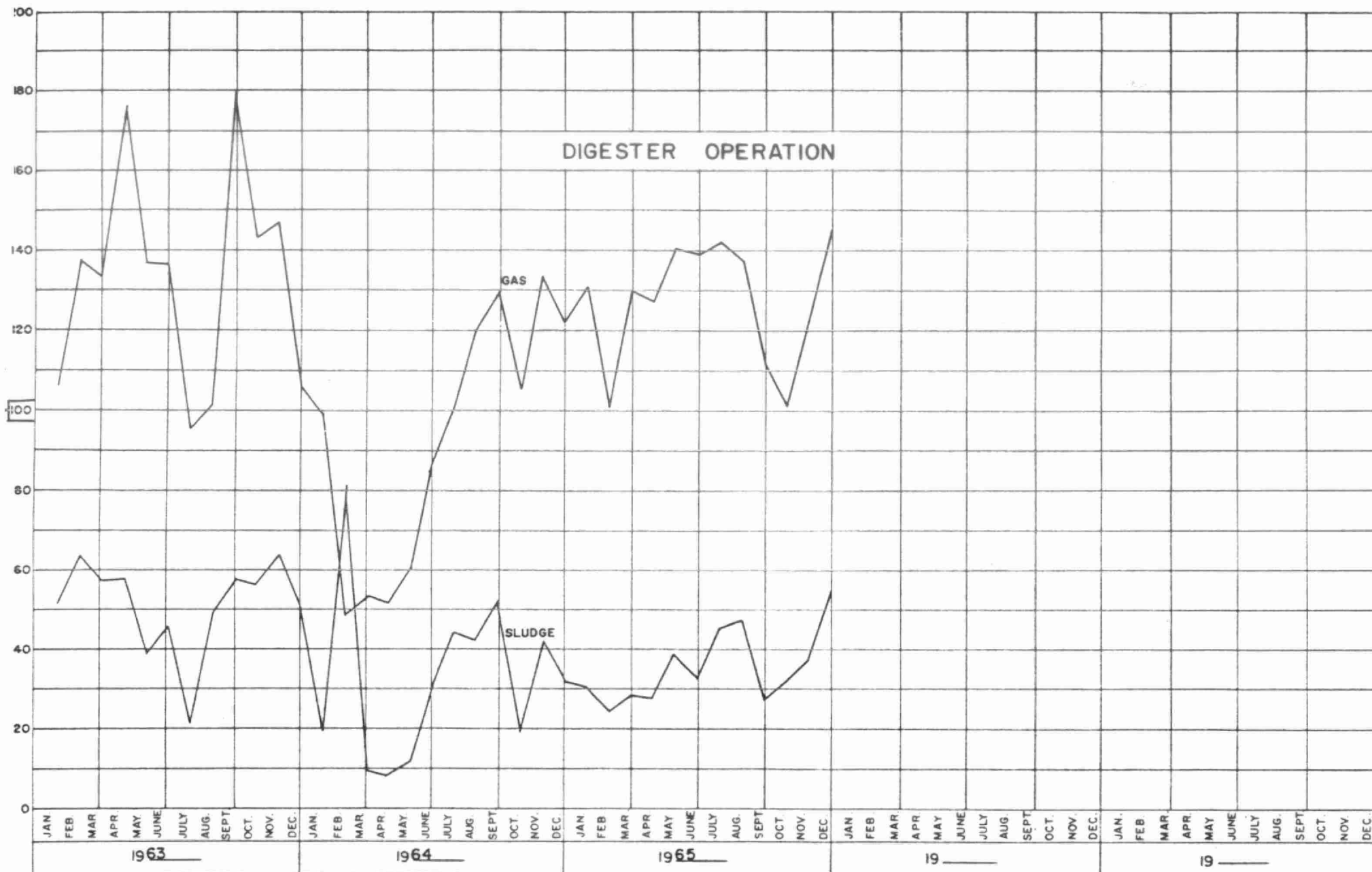


AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. PPM.	MLSS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.
JANUARY	50	764	29
FEBRUARY	-	771	-
MARCH	31	775	29
APRIL	16	665	13
MAY	54	855	27
JUNE	78	907	35
JULY	63	924	32
AUGUST	72	849	36
SEPTEMBER	52	970	25
OCTOBER	58	983	28
NOVEMBER	30	1322	15
DECEMBER	-	1526	-
TOTAL	-	-	-
AVERAGE	50	943	27

COMMENTS

Due to the low organic loading, only one half of the aeration tank capacity is operated. The average food to micro-organism ratio of 27 lbs. BOD per 100 lbs. of MLSS falls within the normal operating range of 20 to 40 lbs. for standard activated sludge plants.



DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	
JAN.	4.88	4.50	3.69	3.20	-	-	131.21
FEB.	3.88	4.68	3.67	3.20	-	-	104.59
MAR.	4.49	5.28	3.96	3.20	-	-	129.68
APR.	4.38	5.04	4.04	2.88	3.40	2.09	126.96
MAY	6.12	4.37	3.64	1.60	-	-	140.28
JUNE	5.16	4.77	3.81	1.60	-	-	139.02
JULY	7.23	3.95	3.02	3.85	1.50	0.93	142.04
AUG.	7.53	4.54	3.51	1.92	-	-	137.51
SEPT.	4.35	5.01	3.76	0.96	-	-	111.17
OCT.	5.16	4.76	3.65	1.28	-	-	109.77
NOV.	6.01	5.06	-	-	-	-	122.97
DEC.	8.77	4.50	3.27	3.85	-	-	145.38
TOTAL	67.96	-	-	27.54	-	-	1540.48
AVG.	5.66	4.70	3.64	2.50	2.45	1.51	128.38

COMMENTS

A total of 67,960 cu. ft. of sludge or 425,000 gallons of raw sludge was pumped to the digesters during 1965. On the basis of an average solids content of 4.7%, a total of 200,000 lbs. of dry solids was placed in the digester. Approximately 77% of this material was of an organic nature.

Considerably more supernatant was obtained last year and this resulted in less sludge hauled from the digesters in 1965 than in 1964 and a resultant saving in sludge haulage costs.

The gas production was increased in 1965 due to the increase in flow of raw sewage to the plant.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	30.717	578	1.88
FEBRUARY	31.282	487	1.56
MARCH	37.465	590	1.57
APRIL	36.582	585	1.60
MAY	23.807	507	2.13
JUNE	21.392	682	3.19
JULY	24.666	884	3.58
AUGUST	23.413	1166	4.98
SEPTEMBER	22.801	1090	4.78
OCTOBER	27.404	817	2.98
NOVEMBER	33.521	755	2.25
DECEMBER	33.034	611	1.85
TOTAL	346.084	8752	-
AVERAGE	28.840	729	2.53

COMMENTS

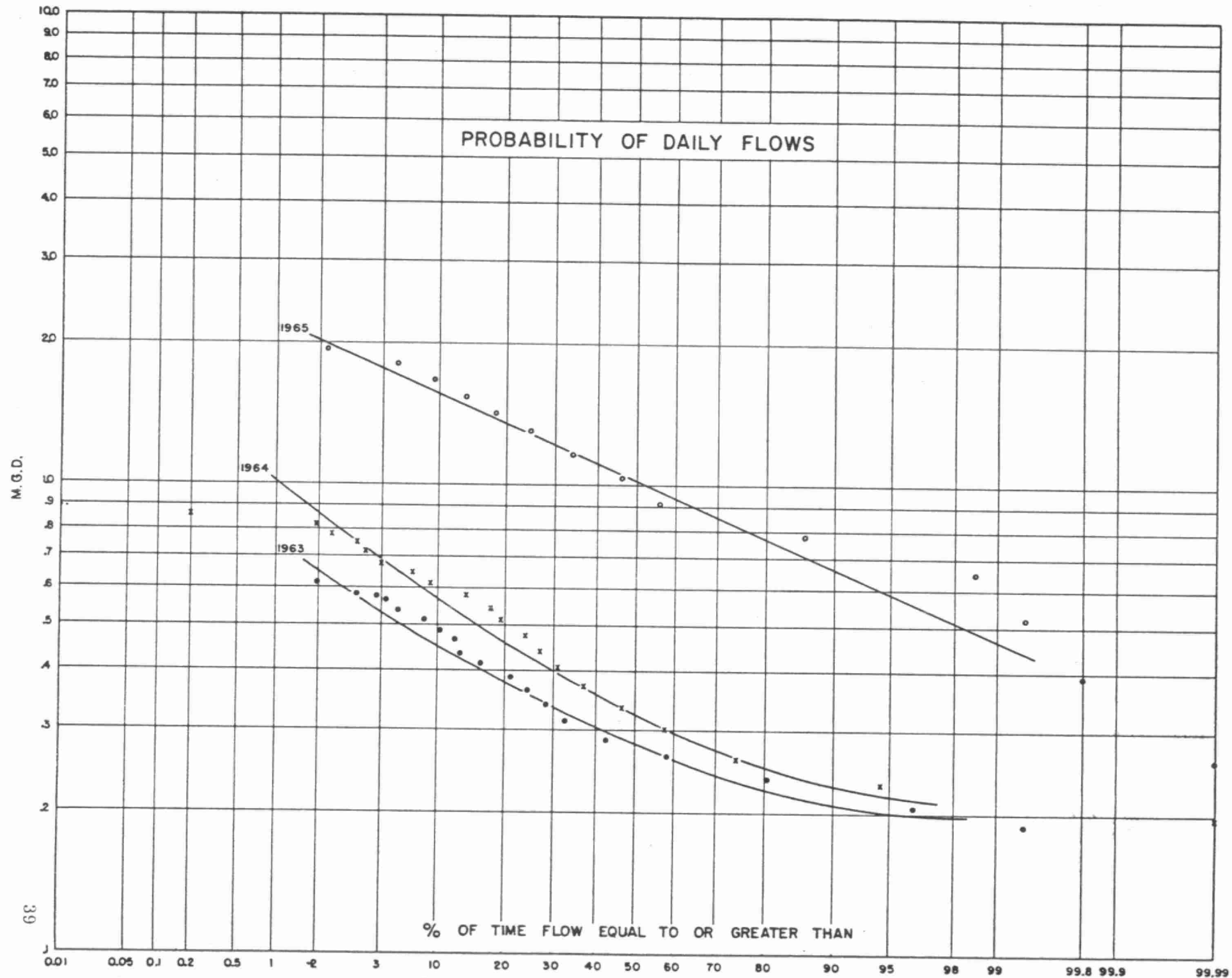
Chlorination of the final effluent is practiced for the entire year at this plant. An average residual after 15 minutes of 0.6 ppm is maintained in order to ensure disinfection of the final effluent.

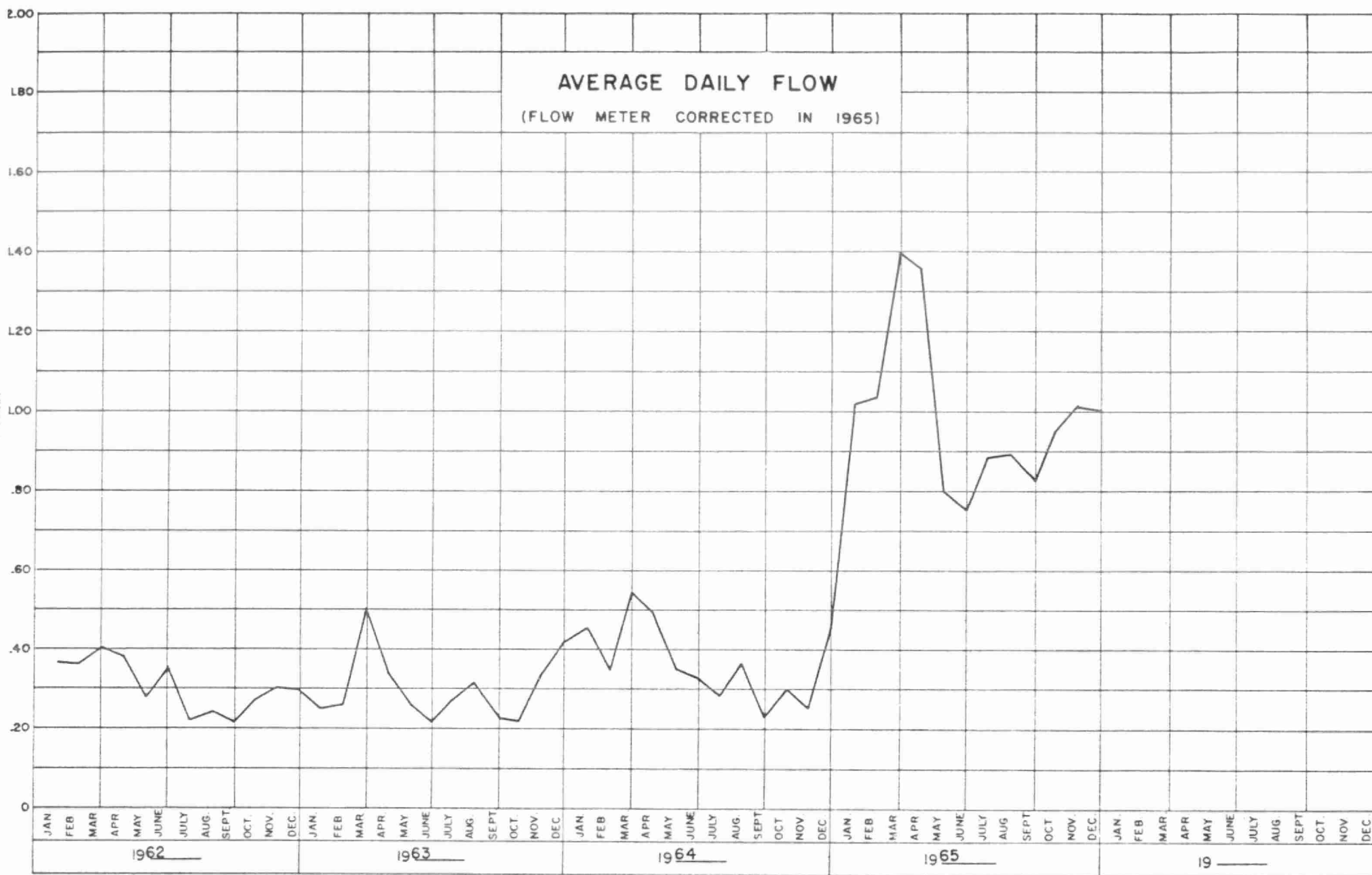
FLOW -- EAST SIDE PLANT

During 1965, a total of 385.429 million gallons was given secondary treatment at the East Side Plant. However, this large increase over the previous year's total flow figure is not due to an actual increase in flow, or at least the greatest percentage is not, but rather to a correction made to the flow meter readings on the basis of fill and draw tests. For this reason it is difficult to compare flow figures from previous years with the 1965 figures.

On the basis of the corrected figures the average daily flow to the plant for the year was 1.06 mgd. The maximum daily 24 hour flow of 2.018 million gallons occurred in February and the maximum average daily flow for one month of 1.45 mgd occurred in March.

The following table and two graphs summarize the flow treated in the East Side Plant. An overflow weir in the inlet chamber permits bypassing flows in excess of the design capacity of the plant. This overflow is ahead of the flow measuring device so the actual flows reaching the East Side Plant are unknown. The overflow of sewage directly to the canal occurred for a total of approximately 1695 hours during 1964.

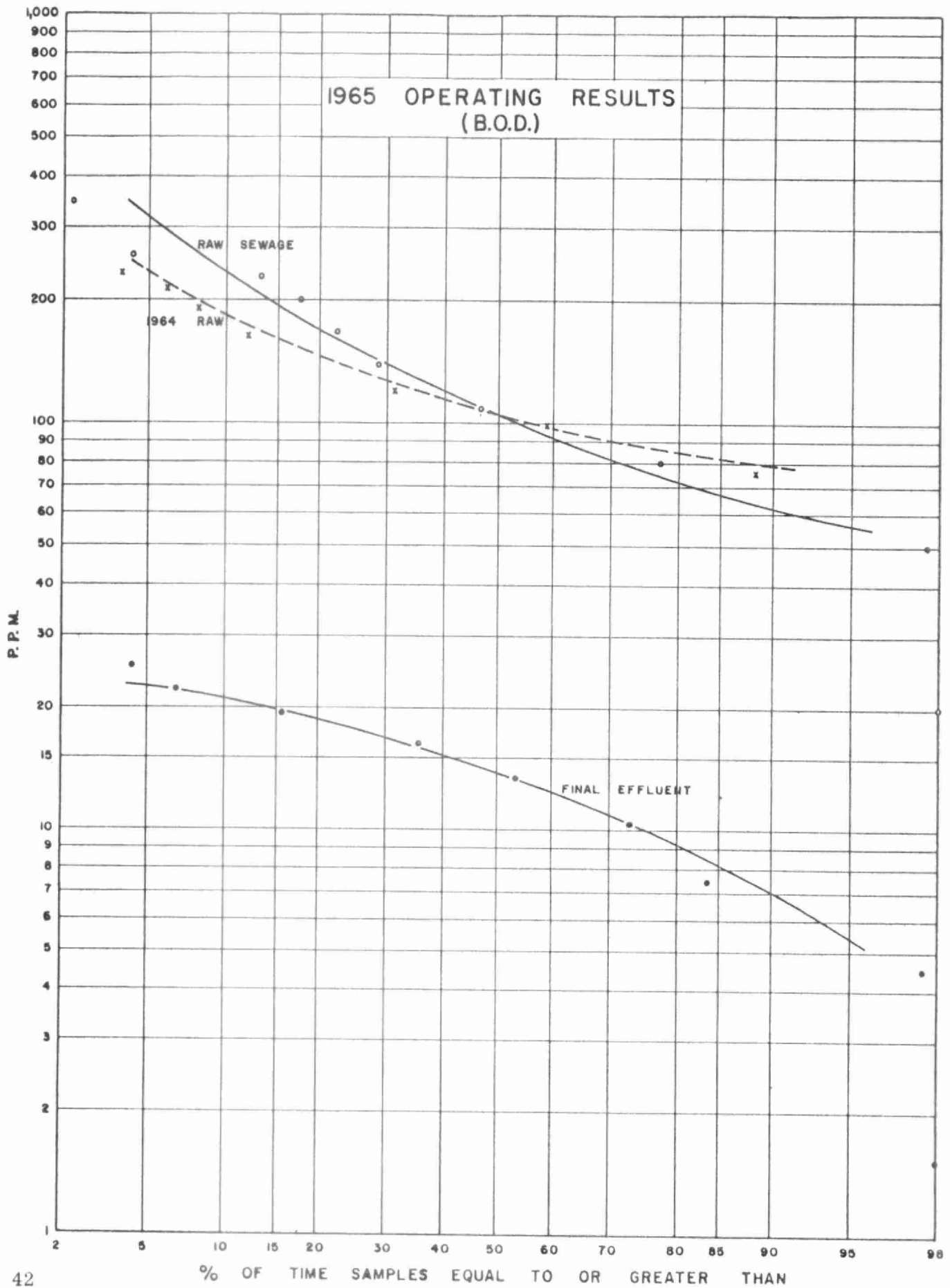


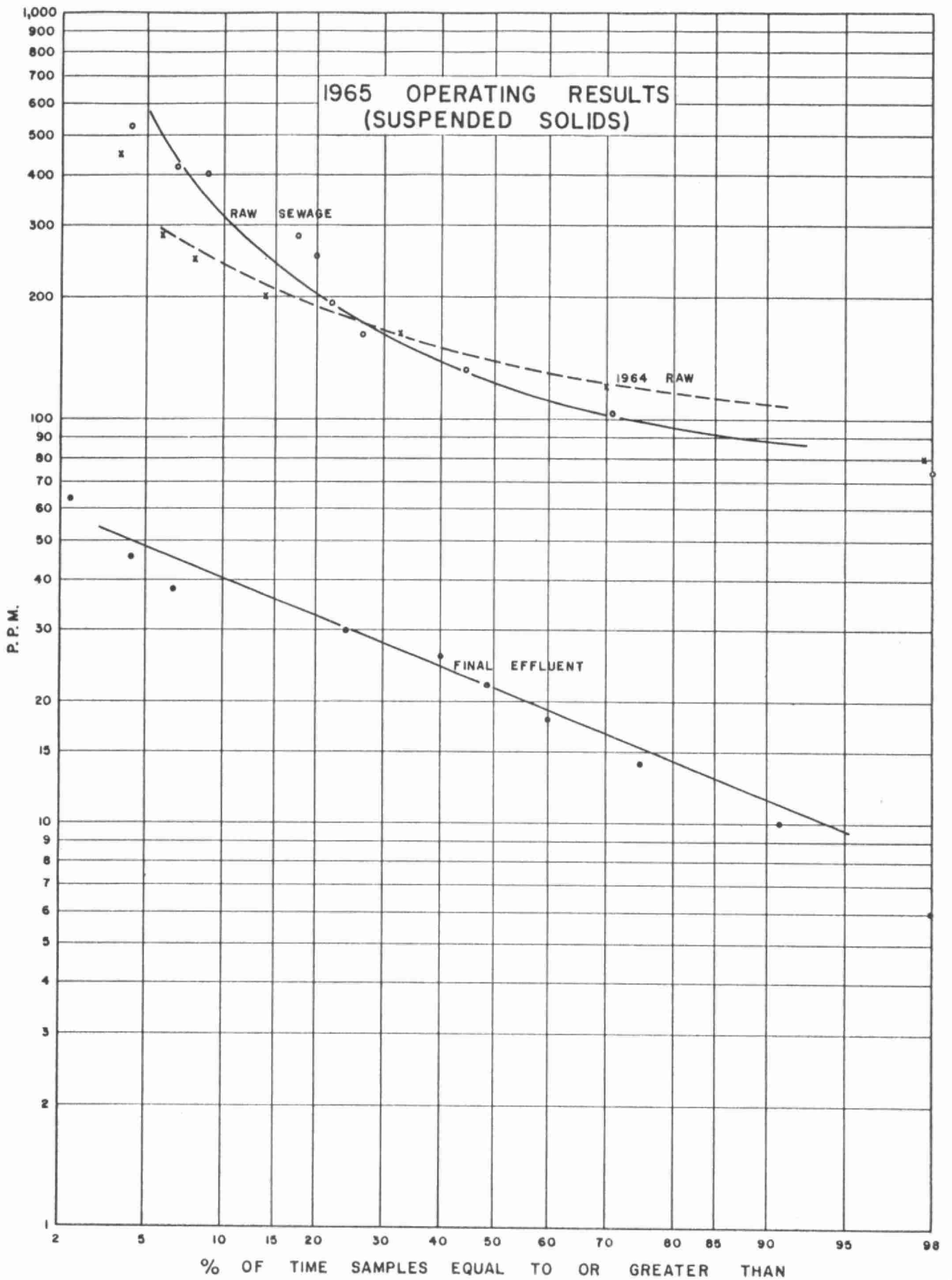


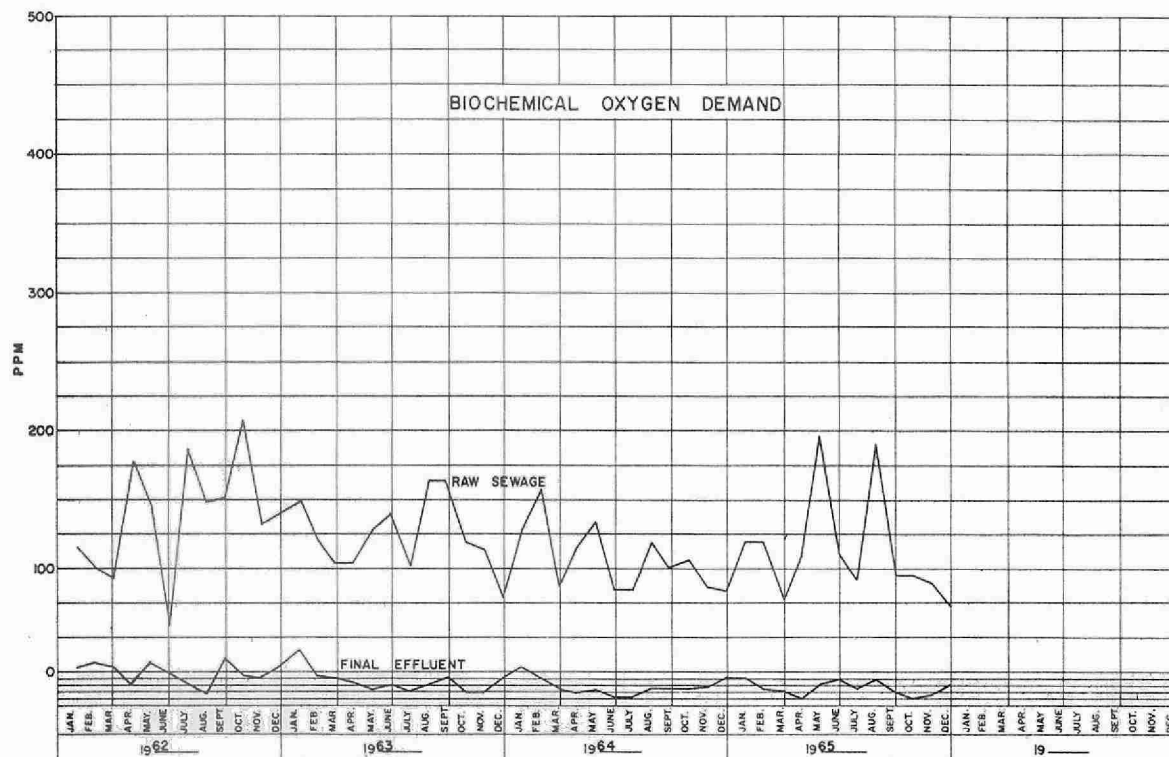
FLOW SUMMARY

(EAST SIDE PLANT)

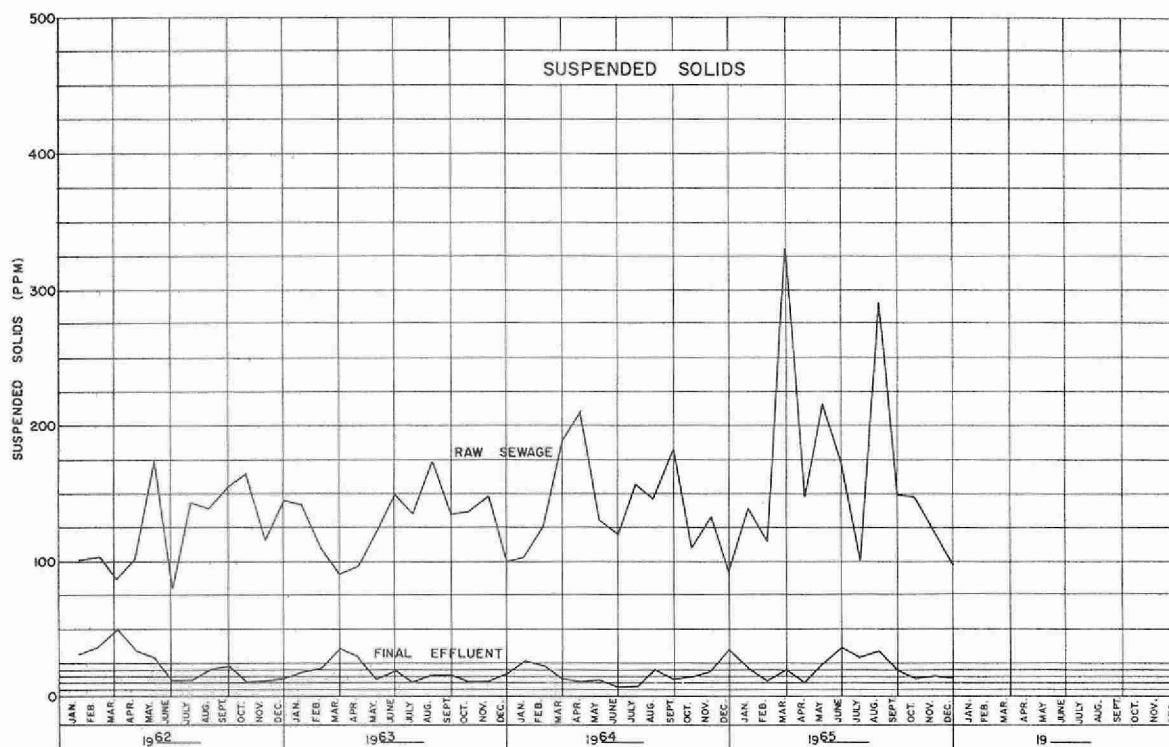
Month	Total Flow MG	Max. Day Flow MG	Max. Rate Flow MG	Min. Day Flow MG
January	36.810	1.913	.950	.824
February	38.609	2.018	.925	.920
March	43.580	1.993	.950	.907
April	40.807	1.831	.950	.971
May	25.001	1.169	.925	.631
June	22.736	1.091	1.000	.456
July	27.399	1.669	.950	.533
August	30.155	1.653	.900	.713
September	24.789	1.422	.960	.623
October	29.469	1.920	2.170	.660
November	33.484	1.920	2.600	.597
December	32.590	1.830	2.100	.730
Total	385.429			
Average	32.119			







MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

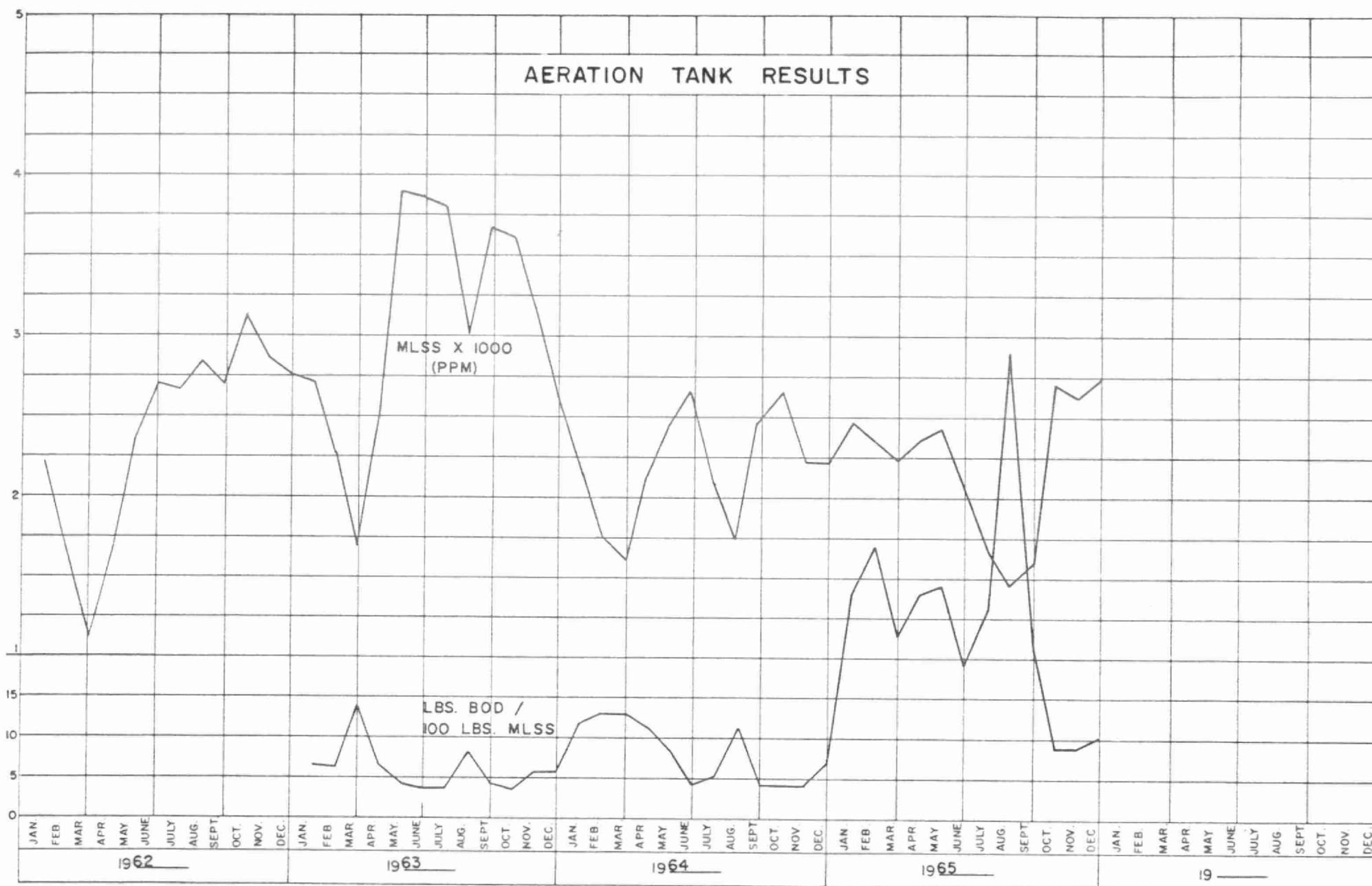
MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	120	20	83.5	18.4	139	21	85.0	21.7	30
FEB.	120	12	90.0	20.8	116	18	84.5	18.9	22
MAR.	78	11	86.0	14.6	303	18	94.0	62.1	37
APR.	109	6	94.5	21.0	147	11	92.5	27.7	8
MAY	197	16	92.0	22.6	216	24	89.0	24.0	-
JUNE	112	18	84.0	10.7	172	36	79.0	15.5	-
JULY	92	13	86.0	10.8	100	28	72.0	9.9	22
AUG.	192	19	90.0	26.1	290	33	88.5	38.7	52
SEPT.	96	10	89.5	10.6	149	18	88.0	16.2	10
OCT.	96	6	93.5	13.3	148	13	91.0	19.9	28
NOV.	80	7	91.0	12.2	123	14	88.5	18.2	-
DEC.	72	14	80.5	9.4	97	13	86.5	13.7	24
TOTAL	-	-	-	194.6	-	-	-	281.4	233
AVG.	114	13	88.5	16.2	167	21	87.5	23.5	19

COMMENTS

The BOD and SS of 114 and 167 ppm in the raw sewage, although higher than the West Side values, are still somewhat below those anticipated in normal sanitary sewage.

The treatment efficiency achieved by the plant is on the average very good when taking into account such factors as flow variations and the general design and condition of the plant.

The quantity of grit removed is below normal but is not uncommon where all sewage is pumped.



AERATION SECTION

MONTH	* B.O.D. PPM.	ML.SS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.
JANUARY	120	2471	28
FEBRUARY	120	2354	34
MARCH	78	2236	23
APRIL	109	2359	28
MAY	197	2430	29
JUNE	112	2080	19
JULY	92	1519	26
AUGUST	192	1464	58
SEPTEMBER	96	1588	21
OCTOBER	96	2708	14
NOVEMBER	80	2640	14
DECEMBER	72	2741	12
TOTAL	-	-	-
AVERAGE	114	2216	26

* Raw BOD. no primaries.

COMMENTS

As a result of corrections made in flow measurement in 1965, new light was shed on the aeration loadings at this plant. Where previously we were under the impression that the aeration tanks were considerably underloaded, it's now evident that loadings are in the normal range for an activated sludge plant.

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	
JAN.	12.50	2.52	1.96	3.20	-	-	89.46
FEB.	11.22	2.48	1.84	5.45	-	-	75.10
MAR.	12.42	2.42	1.87	5.77	3.07	1.75	81.85
APR.	12.10	2.44	1.90	2.56	1.28	0.71	92.41
MAY	14.90	2.47	1.98	1.92	-	-	112.80
JUNE	14.42	3.53	2.68	2.88	-	-	113.95
JULY	14.90	3.70	2.85	4.49	6.50	4.71	113.53
AUG.	14.42	4.02	2.93	2.88	-	-	100.79
SEPT.	7.61	3.44	2.62	1.92	-	-	62.70
OCT.	5.77	2.70	2.06	1.60	-	-	47.26
NOV.	7.05	2.74	2.02	-	-	-	60.82
DEC.	7.45	2.40	1.79	2.24	-	-	66.75
TOTAL	134.76	-	-	34.91	-	-	1017.42
AVG.	11.23	2.91	2.21	3.17	3.62	2.39	84.78

COMMENTS

A total of 134,760 cu. ft. of waste activated sludge was pumped to the digester in 1965. This represents a total of 245,000 lbs. of solids entering the digester.

Again in 1965 considerable supernatant was removed from the digester resulting in a saving in sludge haulage costs.

The gas production in 1965 remained virtually the same as the previous year and was once again below what is normally expected on a per capita basis. The reasons for this are assumed to be a weak raw sewage and an absence of primary clarifiers.

LABORATORY LIBRARY



96936000119840

LIBRARY COPY

NOV 14 1966

ONTARIO WATER
RESOURCES COMMISSION

CONCLUSIONS

Although flow from the recently completed northwest sewers was accepted at the West Side Plant in the latter part of 1965 this did not hamper the ability of the plant to provide adequate treatment to the raw sewage.

However, considerable hydraulic overloading at the East Side Plant continues to pose a real pollution problem. Raw sewage was by-passed during 1965 at this plant for approximately 1700 hours. The plant is capable of handling normal dry weather flow from the East Side and in fact some hydraulic overloading could be tolerated.

But the Fretz Park pumping station is capable of pumping as much as 2 mgd and in fact is doing just that during periods of high surface run-off. To accept flows of this magnitude would merely result in a complete loss of treatment; whereas, at present, approximately 50% of the sewage during these periods is given complete treatment. As mentioned in the 1964 annual report, location and elimination of at least a portion of the storm water entering the sanitary sewers would probably extend the life of the East Side Plant until a better solution to the problem could be financed.

The storm water problem must be solved eventually for economical operation. A third pump will probably be required in the Fretz Park pumping station sometime in 1967.

